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Y10P

IB MYP Year 5

Year 10 Mathematics

Assessment #3

TRIGONOMETRIC PATTERNS

Unit Question: How do we get around? aTeachers: Ms. Luk & Mr. Slosberg
End Date: March 15, 2013 Time Allowed: Double Lesson
Concept Statement: The student will discover one or two formulas which will be useful in the future.

The objective of this task is discover a useful formula for finding out new trig. values from old ones.

IN YOUR BOOK:

- New Trends Mathematics, Chapter 3 & 9 on Trigonometry

INSTRUCTIONS:

- Read the **instructions** and **rubric** carefully.
- Show all **steps** and proper **units.**
- Submit **your own work**. Any copying or other cheating, will automatically receive a 0.
- You are allowed to use non-electronic **dictionary**.
- **Calculators** are allowed.

ASSESSMENT:

- Read the criteria descriptors on the next page carefully before you start your work. This will give you a clear understanding of what is required and what a quality piece of work for this task must include. This way you give yourself the best chance of achieving the highest level in this task.
- This task assesses Criteria B.

Criterion B: Investigating Patterns

Achievement level	Task Specific Rubric	IBO Published Descriptor	Student's Self-Evaluation
0	The student does not reach a standard described by any of the descriptors given below.	The student does not reach a standard described by any of the descriptors given below.	
1–2 Do Maths	The student can calculate trigonometric values correctly.	The student **applies, with some guidance**, mathematical problem-solving techniques to recognize **simple** patterns.	**(0-8)**
3–4 General Rule	The student comes up with a general rule relating the trigonometric ratios.	The student **applies** mathematical problem-solving techniques to recognize patterns, **and suggests** relationships or general rules.	**Teacher's Final Grade**
5–6 Test it	The student tests their general rule by taking a few more examples.	The student **selects and applies** mathematical problem-solving techniques to recognize patterns, **describes** them as relationships or general rules, and **draws conclusions** consistent with findings.	
7–8 Prove it	The student explains how certain they are that they are right and why.	The student **selects and applies** mathematical problem-solving techniques to recognize patterns, **describes** them as relationships or general rules, draws the **correct conclusions** consistent with the correct findings, and **provides justifications or proofs.**	**(0-8)**

ASSESSMENT

Level 1-2

1.Given the following expressions, evaluate

a.sin(x)
b.sin(2x)
c.$\sin^2(x)$
d.cos(x)
e.cos(2x)
f.$\cos^2(x)$

for x = 30°, 150°, 240°, 330°.

Level 3-4

2. Organize the data you found from question 1.
3. Describe a general rule you found involving either sin(2x) or cos(2x)

Level 5-6

4. Suggest another example or two to make certain it is right.

Level 7-8

5.Test your pattern with other methods/identities, justify your formula(s) and give limitations if there's any.

~ End of Assessment ~

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1a $\sin(x) = \sin(30) = \frac{1}{2}$

$\sin(150) = \frac{1}{2}$

$\sin(240) = \frac{-\sqrt{3}}{2}$

$\sin(330) = -\frac{1}{2}$

b $\sin(2x) = \sin(2\cdot 30) = \frac{\sqrt{3}}{2}$

$\sin(2\cdot 150) = \frac{\sqrt{3}}{2}$

$\sin(2\cdot 240) = \frac{\sqrt{3}}{2}$

$\sin(2\cdot 330) = \frac{-\sqrt{3}}{2}$

c $\sin^2(x) = \sin^2(30) = \frac{1}{4}$

$\sin^2(150) = \frac{1}{4}$

$\sin^2(240) = \frac{3}{4}$

$\sin^2(330) = \frac{1}{4}$

d $\cos(x) = \cos(30) = \frac{\sqrt{3}}{2}$

$\cos(150) = -\frac{\sqrt{3}}{2}$

$\cos(240) = -\frac{1}{2}$

$\cos(330) = \frac{\sqrt{3}}{2}$

e $\cos(2x) = \cos(2\cdot 30) = \frac{1}{2}$

$\cos(2\cdot 150) = \frac{1}{2}$

$\cos(2\cdot 240) = -\frac{1}{2}$

$\cos(2\cdot 330) = \frac{1}{2}$

f $\cos^2(x) = \cos^2(30) = \frac{3}{4}$

$\cos^2(150) = \frac{3}{4}$

$\cos^2(240) = \frac{1}{4}$

$\cos^2(330) = \frac{3}{4}$

2

	$\sin(x)$	$\cos(x)$	$\sin(2x)$	$\cos(2x)$	$\sin^2(x)$	$\cos^2(x)$
30°	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{3}{4}$
150°	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{3}{4}$
240°	$\frac{-\sqrt{3}}{2}$	$-\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$-\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{4}$
330°	$-\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{-\sqrt{3}}{2}$	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{3}{4}$

3 I had find the patterns from $\sin(2x)$ no metter 30°, 150°, 240° or 330°, all the noninator and denominator are both the same and their noninator is $\sqrt{3}$ and denominator is 2. In the same case $\cos(2x)$ are still the same for cos the noninator is 1 and denominator is 2. Also $\sin(2\times 30)$, $\sin(2\times 150) = \frac{\sqrt{3}}{2}$ and so do $\cos(2\times 30)$, $\cos(2\times 150) = \frac{1}{2}$. It means that is sin or cos with 30° or 150° the answer would be the same.

4 For example if cos and sin $(30°, 150°, 240, 330°)$ their noninator and denominator are same. We can add in few more number to try like $60°, 120°$. From the chart below can show the both noninator and denominator are same with $60°, 1$

	sin2(x)	cos2(x)
30	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$
60	$\frac{\sqrt{3}}{2}$	$-\frac{1}{2}$
120	$\frac{-\sqrt{3}}{2}$	$-\frac{1}{2}$
150	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$
240	$\frac{\sqrt{3}}{2}$	$-\frac{1}{2}$
330	$\frac{-\sqrt{3}}{2}$	$\frac{1}{2}$

	sin2(x)	cos2(x)	tan2(x)
30	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$\sqrt{3}$
150	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$-\sqrt{3}$
240	$\frac{\sqrt{3}}{2}$	$-\frac{1}{2}$	$-\sqrt{3}$
330	$\frac{-\sqrt{3}}{2}$	$\frac{1}{2}$	$-\sqrt{3}$

question 5.

5 Also tan2(x) can prove that tan(2x) are same. For tan2(x) $\sqrt{3}$ is the number there they were all same, I have test my pattern with tan2(x) to justify my formula is righ I creat a chart up here.